

Inconel 690 Technical Datasheet PDF

Alloy 690 / UNS N06690 Forgings

Technical-parameter edition compiled exclusively from the source webpage content

<https://www.jnmtforgedparts.com/inconel-690-forgings.html>

This version is structured for searchable text extraction, clear entity recognition, and keyword-rich technical indexing.

Technical Overview

Inconel 690 (also known as Alloy 690 or UNS N06690) is a high-chromium nickel-iron alloy which contains $\geq 58\%$ nickel, 27-31% chromium, and 7-11% iron. It offers great resistance to corrosive aqueous media, primary water stress corrosion cracking (PWSCC), and high-temperature oxidation. According to the source page, it is used for nuclear power plant steam generator tubesheets, reactor coolant pump (RCP) parts, and petrochemical heat exchanger internals.

Key Technical Parameters

Parameter	Value
Material Name	Inconel 690
Alternate Names	Alloy 690, UNS N06690
Nickel (Ni)	$\geq 58.0\%$
Chromium (Cr)	27.0-31.0%
Iron (Fe)	7.0-11.0%
Density	8.19 g/cm ³
Maximum Service Temperature	1093°C (2000°F)
Tensile Strength	724 MPa (105,000 psi)
Yield Strength	348 MPa (50,500 psi)
Primary Standards	ASTM B166, ASTM B564, ASME Sec.III
Main Use Fields	Nuclear PWR, Petrochemical
Forging Weight Range	30 kg - 30,000 kg
Maximum Ring Outside Diameter	Up to 5000 mm

Applicable Material Standards and Designations

Category	Details from Source Page
Material Designations	Inconel 690 / Alloy 690 / UNS N06690
Product Standards	ASTM B166, ASTM B564, ASME Section III
Referenced Testing Standards	ASTM A370, ASTM E8, ISO 6892-1, ASTM E23, ASTM A751, ASTM E415, ASTM E1086, ASTM
International Compliance Mentioned	ASME / ASTM (USA), EN / DIN / PED (Europe), JIS (Japan), BS (UK)

Chemical Composition

Element	Specified Range
Nickel (Ni)	58.0% minimum
Chromium (Cr)	27.0% - 31.0%
Iron (Fe)	7.0% - 11.0%

Element	Specified Range
Carbon (C)	0.05% maximum
Silicon (Si)	0.50% maximum
Manganese (Mn)	0.50% maximum
Sulfur (S)	0.015% maximum
Copper (Cu)	0.50% maximum

Mechanical Properties – Annealed Condition

Property	Metric Value	Imperial Value
Tensile Strength	724 MPa	105,000 psi
Yield Strength (0.2% Offset)	348 MPa	50,500 psi
Modulus of Elasticity	211 GPa	30,600 ksi
Shear Modulus	81.8 GPa	11,900 ksi
Poisson's Ratio	0.289	0.289
Elongation at Break	41%	41%

The source page states that testing for these properties is performed in accordance with ASTM A370, ASTM E8, or ISO 6892-1. Hardness testing is referenced to ISO 6506-1 / ASTM E10, ISO 6508-1 / ASTM E18, and ISO 6507-1 / ASTM E384. CVN impact testing is referenced to ASTM E23 or equivalent international standard.

Manufacturing Route / Melting Method

- Standard Commercial Production Route: Basic Electric Furnace (EF) Melting → Argon Oxygen Decarburization (AOD) / Vacuum Oxygen Decarburization (VOD) / Vacuum Degassing → Electroslag Remelting (ESR) / Electroflux Remelting (EFR) / Vacuum Arc Remelting (VAR) → optional secondary VAR.
- High-Quality Nuclear Grade Production Route (VIM+VAR): Vacuum Induction Melting (VIM) → ESR / EFR / VAR → optional secondary VAR.

Inspection and Quality Control Standards

Inspection Item	Standards / References Listed on Source Page
Mechanical Testing	ASTM A370, ASTM E8, ISO 6892-1
Hardness Testing	ISO 6506-1, ISO 6508-1, ISO 6507-1, ASTM E10, ASTM E18, ASTM E384
Impact Testing	ASTM E23
Chemical Analysis	ASTM A751, ASTM E415, ASTM E1086
NDT	ASTM A388/A388M, ASTM E2375, ASTM E127, ASTM E428
Surface Examination	INSP/MS/10
Heat Treatment Qualification	HTQR/MS/01
Traceability Retention	Records kept for a minimum of 10 years upon customer request

Delivery, Size and Product Scope

Technical Scope Item	Value / Description
Forging Weight Capability	30 kg to 30,000 kg
Maximum Seamless Ring OD	Up to 5000 mm
Product Forms Mentioned	Forged bars & shafts; seamless rolled rings & hollow parts; forged discs, plates & blocks;
Machining Capability	Steel melting, forging, heat treatment to machining according to client drawings and tec

Typical Technical Application Scope

Application Area	Technical Use Described on Source Page
Nuclear Steam Generator Systems	Tubesheets, baffles, flow limiter venturi forgings, steam generator divider plates
Reactor Coolant Pump (RCP) Systems	RCP casings, impellers, rotors, seal chamber parts, bearing housings
Petrochemical / Energy Equipment	Pipe tubes, channel flanges, baffle plates, pressure vessel nozzles, transition cones
Industrial Valve & Fluid Control Systems	Balls, bonnets, bodies, stems, seat rings, cores, discs
Gas Compressor / Industrial Turbine Systems	Flat rectangular bars and turbine blades

Mill Test Report / Documentation Content

- Purchase Agreement Number, PDS Specification & Revision Number, Drawing & Item Number
- Total parts per shipment, Heat Number, Raw Material Source & Full Manufacturing Details
- Heat Treatment Temperature & Holding Time Charts
- Chemical Composition for each Heat and individual Forging
- Tensile Properties, Hardness Test Results, and Creep Rupture Test Data for each Forging
- Macro Etch & Microstructure Examination Results (with photographs)
- NDT Results, Forging & Test Identification Numbers
- NCR Number, Manufacturer Name, and statement of accordance with all specification
- Written approval document for any approved difference from the purchase

Source and Content Scope Note

This PDF intentionally limits content to technical parameters, material data, standards, process route, inspection items, and documentation items stated on the source webpage. It excludes broader marketing content so that the document is more suitable for technical search indexing, keyword matching, and AI / generative-engine extraction.

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